SYLLABUS

OF A

COURSE OF LECTURES

IN

NATURAL AND EXPERIMENTAL PHILOSOPHY,

TO BE DELIVERED IN THE

THEATRE

OF THE

DUBLIN SOCIETY.

BY JAMES LYNCH.

Commencing on Tuesday the 2d of March 1819, *at a Quarter past three o'Clock.*

DUBLIN:

GRAISBERRY AND CAMPBELL, 10, BACK-LANE,
PRINTERS TO THE DUBLIN SOCIETY.

1819.

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SYLLABUS.

LECTURE I.

Tuesday, March 2.

The Introduction.—Shewing the usefulness of the study of Natural Philosophy—rules for philosophizing—matter, the subject of Natural Philosophy—the properties of matter—its indifference to rest or motion—divisibility of matter, exemplified in the gilding and silvering of metals—by the diffusion of light and odours—of motion—of time and extention—extension is to space, what duration is to time—a body to describe space, requires time—the measure of motion, is composed of space, and time—of velocity.

LECTURE II.

Thursday, March 4.

The Laws of Motion.—Momentum is the power or force, which a moving body has to strike an obstacle—whatever changes the

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state of rest or motion of a body, is called a force, the composition and resolution of forces—action and re-action, equal and contrary—a machine where motion is communicated by re-action.

LECTURE III.

Saturday, March 6.

On Collision.—The collision of non-elastic and elastic bodies—two bodies falling through circular arches in opposite directions, arrive at the lowest point at the same time, although the arches described are unequal—the velocity acquired by a body falling through a circular arch, is proportional to the chord of the arch—collision of non-elastic balls—collision of elastic bodies—a series of elastic balls—curious application of the principle of percussion, in a machine for raising water.

LECTURE IV.

Tuesday, March 9.

Attraction of Cohesion.—Attraction between the particles of fluids—solid bodies cohere, shewn by polished plates of brass—pieces of lead cohere with great force—attraction between solids and fluids—between water and

glass—water rises between parallel glass planes—if the planes touch at one edge, the water rises highest next the sides in contact, forming a curve—water rising in capillary tubes —in a series of tubes of different diameters, the height will be inversely as their diameters —heat produces no change in the phenomena of capillary attraction—they take place in vacuo——all fluids are not alike attracted—the appearances are reversed, when the experiments are instituted with mercury—application of this priuciple, for the solution of several natural phenomena, and of various processes in the arts and manufactures—water raised by means of attraction in the rope pump.

LECTURE V.

Thursday, March 11.

On Gravity.—Gravity not an essential property of matter—is insensible between the smaller masses of matter—constitutes weight—decreases inversely as the squares of the distance increases —acts at great distances—all bodies would descend with equal velocity, only for the resistance of the air, shewn by the air pump—no difference can be perceived in the power of gravity, at any distance to which we can go above the surface of the earth—the figure of the earth —the attraction of a mountain proved, by Dr. Maskelyne's observations on Shehalien, in Scot-

land—the action of gravity on bodies falling freely, causes them to move with an accelerated velocity—the spaces described, are as the squares of the times—a body falling by the force of gravity is uniformly accelerated—a body projected upwards is uniformly retarded.

LECTURE VI.

Saturday, March 13.

Electricity.—The electric fluid subtle and elastic has an attractive and repellent power—is a body—conductors and non-conductors—some bodies become conductors, or non-conductors, by a change of circumstances—glass not a perfect non-conductor—air an imperfect conductor—different fluids have different conducting powers—metals the most perfect conductors—the electric matter conveyed over the surface and through the substance of conducting bodies—the properties of insulated conductors—on excitation of electricity—non-conductors may be partially excited—the electricity of glass and of sealing wax—positive and negative electricity—charging an electric plate—the Leyden phial—an insulated electric cannot be charged—the charge resides in the electric, not in the coating—a plate of air charged—an electric once charged can receive no addition by continuing the operation.

LECTURE VII.

Tuesday, March 16.

Electricity.—The electric jar—charging and discharging a jar—the residuum—the electric circuit—the fluid will pass through the shortest circuit—of the lateral shock—if an electric discharge be interrupted by non-conductors, it generally rends them in pieces—electric light in vacuo similar to what sometimes appears in the clouds---the effects of points applied to excited electrics—different appearance of positive and negative electricity on pointed conductors—points draw off electricity—Franklin's discovery of the identity of lightning and electricity—the use of conductors for protecting buildings from being damaged by lightning—exemplified by experiments—the construction of various electrometers—inflammable substances fired by electricity—the electrophorus—medical electricity —the torpedo.

LECTURE VIII.

Thursday, March 18.

Galvanism.—Volta's pile---Cruikshank's battery---the same improved by Sir H. Davy.

LECTURE IX.

Saturday, March 20.

Magnetism.---The polarity of the loadstone, a modern discovery—the natural magnet an

iron ore---has a north and a south pole—has an attractive and a repulsive power—will, when left to move freely, incline towards the horizon —will communicate its virtue---its virtue extends to a considerable distance---acts through any substance except iron—the magnetic meridian---a magnet has sometimes more poles than two---the magnetic centre---spherical magnet---a magnet broken, each fragment becomes a complete magnet---the influence of magnets on each other---the poles of a weak magnet may be changed---steel filings made magnetic in a glass tube---artificial magnets, and the manner of making them---to find the poles of a magnet---attraction between a magnet and iron reciprocal ---a long bar of iron has frequently many poles ---the Mariner's compass—the Surveyor's compass---the Azimuth compass—the variation of the needle an impediment to navigation---the dipping needle—directions for the construction of the Mariner's compass.

LECTURE X.

Tuesday, March 23.

The centre of Gravity.---The centre of magnitude---the centre of motion---a body suspended by the centre of gravity rests in any position—suspended by any other point, it rests only when the centre of gravity is exactly above, or below the point of suspension—the line of direction—why some bodies stand firm

and others fall—of the equilibrium of animals—some bodies appear to ascend, whilst the centre of gravity really descends—the loaded cylinder—a bucket that goes with the mouth downwards when empty, and upwards when full—the rolling lamp—bodies that slide, roll, or tumble down an inclined plane—to find the centre of gravity of a body—the plumb line—the carpenter's level—the centre of gravity may be changed, by making an addition to a body—some bodies have their centre of gravity out of the body—motion produced in a machine by means of changing the centre of gravity—the water clock.

LECTURE XI.

Thursday, March 25.

The Lever and Balance.—The simple lever or first kind—the angular lever—lever of the second kind—lever of the third kind—the compound lever—the balance—requisite properties of a good balance—its adjustments—the steel yard—different kinds of steel yards—the corn balance—the weighing machine.

LECTURE XII.

Saturday, March 27.

The Axle in the Wheel.—The axle and wheel with tooth and pinion—the double axle

with different diameters—the fusee of a watch—the tumbler of a gun lock—the circular motion in the steam engine, called by workmen the sun and planet motion—cranes for raising of goods.

LECTURE XIII.

Tuesday, March 30.

The Pulley.—The fixed pulley—the moveable pulley—different systems of pulleys—the Spanish burtons—Smeaton's pulleys—Walker's patent pulleys—friction rollers applied to pulleys—the pulleys with spring blocks for ships' rigging.

LECTURE XIV.

Thursday, April 1.

The inclined Plane, the Wedge, and the Screw.—The great power of the screw—its friction of use in its general application—the square and sharp thread—the perpetual screw of great use in regulating the motion of engines, in conjunction with the fly—the coining engine.

LECTURE XV.

Saturday April 3.

The Pendulum.—The properties of pendulums—their application to the regulation of clocks—the best method of ascertaining the

length of pendulums—the centre of oscillation—of the Cycloid—its application to pendulums—impediments to the true going of clocks—errors by expansion—expansion of metals shewn by the pyrometer—unequal expansion of different metals—Mr. Graham's mercurial pendulum—Mr. Harrison's gridiron pendulum—Mr. Elicot's pendulum---the balance wheel of a watch---its compensation for expansion.

LECTURE XVI.

Tuesday, April 6.

Optics.—On the properties of light—solar light—light is material—its velocity—its intensity decreases as the square of the distance from the radiant increases—refraction of light, and the laws by which it is governed—the refractive power of different mediums.

LECTURE XVII.

Thursday, April 8.

Optics.—On the different refrangibility of the rays of light—the prismatic spectrum—the rainbow.

LECTURE XVIII.

Saturday, April 10.

Optics.—The properties of lenses—there are five different denominations of lenses—the refraction of light by concave and convex surfaces—focus of a double convex lens—the distance and magnitude of an image formed by a convex lens, with respect to the position of an object, or radiant point—a double concave lens has no positive focus—its virtual focus determined—the plano convex lens—its focus determined—the plano concave lens, its virtual focus determined—a miniscus lens has a positive, or virtual focus, according as the convex or concave surface has the greater curvature---the focus of an entire sphere---the multiplying glass.

LECTURE XIX.

Tuesday, April 13.

Optics.---On the reflection of light---the angle of incidence---the angle of reflection---the angle of incidence and reflection always equal---the properties of a plane mirror---a concave mirror, its focus determined under various circumstances---the position and magnitude of the image formed by a concave mirror---the aerial image---convex mirrors have no positive focus---their virtual focus behind the reflecting surface---the image of an object is diminished and behind---the mirror.

LECTURE XX.

Thursday, April 15th.

Optics.—The construction of the eye—on vision—the camera obscura.

LECTURE XXI.

Saturday, April 17th.

Optics.—The theory of refracting telescopes—of reflecting telescopes—of microscopes single and compound—the solar microscope—the magic lantern—the camera lucida.

END OF THE FIRST PART.